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A device to detect or generate optical signals

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**Claims**

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1. A device to detect optical signals with

means (10, 11, 20, 80) to generate at least one reference light ray which has frequency shift and or frequency modulation or phase shift and/or phase modulation and/or time displacement over the optical signal to be detected;

means (20, 30) with which the optical signal to be detected and/or the reference light ray(s) can be aligned in such a way that they can be brought to interference;

and with at least one detector (40) with a demodulator (50) by which amplitude modulation can be detected

**characterised in that**

at least one wavelength-dependent element (11, 12, 14) is provided by means of which the angle(s) of the light rays brought to interference can be changed in dependence on the wavelength, and

at least one of the detectors (40) is designed in such a way or is in combination with a demodulator (50) and/or with optical elements in such a way that a time and/or spatial modulation of the intensity with reference to the whole or parts of the ray cross-section detected can be measured.

2. A device to generate optical signals by modulation of optical carriers with

means to generate at least one reference light ray which has frequency shift and/or frequency modulation or phase shift and/or phase modulation and/or time displacement over the optical carrier to be modulated;

means with which the optical signal to be detected and/or the reference light ray(s) can be aligned in such a way that they can be brought to interference;

and with at least one coupler by means of which the resulting interference signal can be coupled out,

**characterised in that**

at least one wave-dependent element is provided by means of which the angle(s) of the light rays brought to interference can be changed in dependence on the wavelength, and

at least one of the couplers is designed in such a way or is in combination with a demodulator and/or with optical elements in such a way that the coupled out

signal is dependent on the time and/or spatial modulation of the intensity with reference to the whole or parts of the ray cross-section detected.

3. A device in accordance with either of claims 1 or 2, wherein the means (10, 11, 20, 80) to generate at least one reference light ray, which has frequency shift and/or frequency modulation or phase shift and/or phase modulation and/or time displacement over the optical signal to be detected, include a beam splitter and a frequency shifter and/or frequency modulator or a phase shifter and/or phase modulator (20) and/or a travel distance (90).
4. A device in accordance with one or more of claims 1 to 3, wherein the means to generate at least one reference light ray, which has frequency shift and/or frequency modulation or phase shift and/or phase modulation and/or time displacement, include a local light source.
5. A device in accordance with one or more of claims 1 to 4, wherein at least one of the wavelength-dependent elements (11, 12, 14) includes a diffracting optical element, in particular an optical grating (11, 14), a hologram or a system of thin films.
6. A device in accordance with one or more of claims 1 to 5, wherein at least one of the wavelength-dependent elements (11, 12, 14) includes a dispersing optical element, in particular a prism (12).
7. A device in accordance with one or more of claims 1 to 6, wherein at least one of the wavelength-dependent elements (11, 12, 14) is designed as a beam splitter (11) or a combiner.

8. A device in accordance with one or more of claims 1 to 7, wherein at least one of the wavelength-dependent elements (11, 12, 14) is designed in such a way that the type or degree of dependence of angle deflection can be changed by the wavelength.
9. A device in accordance with one or more of claims 1 to 8, wherein at least one of the wavelength-dependent elements is simultaneously designed as a frequency shifter and/or frequency modulator or a phase shifter and or phase modulator.
10. A device in accordance with claim 9, wherein one or more of the wavelength-dependent elements is designed as an acousto-optical modulator.
11. A device in accordance with one or more of claims 1 to 10, wherein means are provided by means of which the reference light ray and/or the optical signal can be deflected.
12. A device in accordance with one or more of claims 1 to 11, wherein at least one of the wavelength-dependent elements (11, 12, 14) is positioned in a rotating and/or swivelling manner.
13. A device in accordance with one or more of claims 1 to 12, wherein at least one multiplex hologram is provided and/or other optical elements by means of which multiple rays can be handled simultaneously.
14. A device in accordance with one or more of claims 1 to 13, wherein parts of the device are provided in multiple and/or by means of parts of the devices named, multiple rays can be handled.

15. A device in accordance with one or more of claims 1 to 14, wherein means are provided to change the ray cross-section of at least one of the rays involved.
16. A device in accordance with one or more of claims 1 to 15, wherein means are provided for the spectral filtration or spatial modulation of phase or amplitude of at least one of the rays involved.
17. A device in accordance with one or more of claims 1 to 16, wherein all or a part of the rays involved are guided wholly or partially through wave guides and/or wherein all or a part of the optical elements are formed by means of the integrated optics.
18. The use of a device in accordance with one or more of claims 1 to 17 as the optical receiver or optical modulator or as the spectrometer.